

Biology

Essentials

Taught programme

MSc degree

Developmental Cell Biology

Research programmes

MPhil, PhD Biology

Related programmes

MSc in Cellular and Molecular Neuroscience (p131)

MSc in Imaging in Biomedical Research (p47)

Admissions requirements

For information on overseas qualifications that meet the admissions requirements, refer to pages 156-157

MSc

A first- or second-class undergraduate honours degree in a relevant subject such as biology, chemistry or medicine

MPhil and PhD

A first- or upper second-class undergraduate honours degree in a subject relevant to your chosen area of research

English language requirements

IELTS 6.5, with not less than 6.5 in Writing and 6.0 in the other sections. Internet TOEFL with 92 overall, with 21 in Listening, 22 in Reading, 24 in Speaking and 25 in Writing. For more information and alternative English language requirements, refer to page 156

Fees

Refer to pages 158-159 for information on fees

Further information

Taught programme

Biology, PG Admissions,
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Research programmes

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- In the 2008 Research Assessment Exercise (RAE) 80 per cent of our biology research was rated as recognised internationally or higher, and over one-third rated as internationally excellent or higher.

- Sussex was ranked 8th in the UK for biosciences in *The Guardian University Guide 2012*, 15th in the UK for biological sciences in *The Complete University Guide 2011-12* and 16th in the UK in *The Times Good University Guide 2012*.

- Biology at Sussex offers excellent facilities, supporting a wide range of interrelated research areas.

- There are three overlapping research sub-groups: Environmental Systems and Processes Research Group, Evolution, and Genetics and Development (refer to page 50).

- The research environment is enhanced by activities associated with a number of interdisciplinary research centres across campus, including the Genome Damage and Stability Centre and the Centre for the Study of Evolution.

- New opportunities for collaboration are provided by the expanding research activities in the Brighton and Sussex Medical School.

- Research students can expect an extensive programme of generic skill-enhancing instruction in their first year, and supervision from two academics.

Male common fruit fly (*Drosophila melanogaster*)



Taught programme

MSc in Developmental Cell Biology 1 year full time

Developmental cell biology lies at the core of our understanding of how organisms develop from stem cells through to adults. This MSc programme comprises five core courses, teaching both practical techniques and the experimental approaches to aspects of cell and molecular biology required to understand development, as well as the theoretical background to these processes. A large part of the degree is devoted to a research project, undertaken in the School of Life Sciences or the Brighton and Sussex Medical School (BSMS).

Career opportunities

A large number of our graduates go on to study for a PhD in a related field either at Sussex or at other top UK universities. Some have embarked on a career in the field of biotechnology within the pharmaceutical industry.

Programme structure

Autumn term: Techniques in Cell and Developmental Biology • Topics in Cell and Developmental Biology.

Spring term and vacation: Developmental Neurobiology • Genes and Development

- Topics in Genetic Manipulation and Molecular Cell Biology. You also start your research project.

Summer term and vacation: you continue your research project.

Assessment

You are assessed by essays, poster presentations, examinations and a dissertation (including an oral exam).

Research programmes

Research projects are available in ecology and behaviour, evolution, genetics and development, plant sciences and systems biology.

Recent thesis titles

Adaptive and nearly neutral evolution with a focus on the enteric bacteria

Behavioural ecology of urban stone martens (Martes foina) in Luxembourg

Ecology and behaviour of urban badgers (Meles meles)

Ecophysiology of the halophyte Suaeda maritima

Effective population size and its effects on molecular evolution

Evolution and maintenance of the isochore structure in vertebrate genomes

Fuelling ecology and migratory strategies: a study of two Acrocephalus warblers

Interactions between rabbits, plants and soil, and their consequences for chalk grassland and chalk heath vegetation communities

Population ecology and conservation of Nervilia nipponica, an endangered orchid in Japan

Rates of adaptation in complex genetic systems

The evolution of animal body plans

The interactions between plants and invertebrate herbivores under saline conditions

The tempo and mode of invertebrate molecular evolution

Career opportunities

Our graduates have gone on to careers in research and hold posts such as lecturer, scientist, and biologist for the Ministry of the Environment, Luxembourg.

Interdisciplinary research centres**Centre for the Study of Evolution (CSE)**

This cross-disciplinary research group aims to develop and utilise evolutionary ideas. Members include biologists, biochemists, mathematicians and computer scientists. CSE builds upon the ethos and distinguished contributions of the late Professor John Maynard Smith, who founded the biology school at the University of Sussex in 1961. CSE runs weekly seminars and a journal club – all are welcome (www.lifesci.sussex.ac.uk/CSE).

Genome Damage and Stability Centre (GDSC)

The GDSC investigates the responses of cells to genome damage, and their relationship to cancer and other aspects of human disease. Purpose-built laboratories – funded by the Joint Infrastructure Fund (JIF), the Wolfson Foundation and the University – provide a dynamic and collaborative environment for carrying out cutting-edge research.

Sussex Centre for Advanced Microscopy

The Sussex Centre for Advanced Microscopy provides state-of-the-art facilities for confocal, 2-photon and time-lapse video microscopy, and cryo- and scanning-electron microscopy. Visit www.lifesci.sussex.ac.uk/scam

Faculty research interests**Environmental Systems and Processes Research Group**

This group is concerned with the interactions of animals and plants with their environments. The fusion of ecology, plant science and environmental science in a single research group provides a breadth of expertise, which allows us to explore a wide range of exciting interdisciplinary topics such as biosphere-geosphere interactions (eg plant-soil interactions or animal-plant-soil interactions) together with how environmental changes (eg increased salinity or contamination) affect these relationships. We are well placed to explore new ideas and initiatives in understanding the responses of organisms to their environment from the molecular to the ecosystem level (metabolomics through to biodiversity). Faculty members of this group are split into three research areas: ecology and behaviour, plant science and environmental science.

Larissa Conradt *Metapopulation ecology.*

Experimental and modelling work to test predictions of existing metapopulation models and develop new models.

Jeremy Field *Social evolution.* Evolutionary ecology of social systems, using wasps and bees. How helping behaviour evolves; social plasticity; conflict resolution; parental care strategies.

David Harper *Behavioural ecology.* Evolution of animal signals; mass regulation by birds; risk-taking behaviour; bird ectosymbionts; declining farmland birds; osmotic loads of birds feeding in saline habitats.



In addition to excellent laboratory facilities, Sussex students have access to a wide range of high-quality field sites

David Hill *Behaviour, ecology and conservation of bats.* Species differences in response to woodland management; comparative patterns of habitat use; the social call function in UK and Japanese bats.

Michael Hutchings *Plant ecology and conservation.* Effects of patchiness in plant resource supply; interactions between roots; conservation; habitat fragmentation effects on plant biodiversity.

Stephen Pearce *Plant retrotransposons.* Uses mobile genetic elements to determine the genetic diversity of rare wild plant populations, and also in plant breeding.

Timothy Roper *Mammal behavioural ecology, especially badgers.* Behavioural aspects of bovine tuberculosis transmission from badgers to cattle; and group decision-making in animals.

Alan Stewart *Insect population and community ecology.* Restoration of grassland invertebrate assemblages; tropical rainforest diversity patterns; and conservation ecology of insect groups.

Evolution

The research at Sussex includes evolutionary theory, where mathematical techniques are used to solve challenging problems within evolutionary genetics; bioinformatics and population genetics, where information technology is used to analyse the avalanche of data being produced by genome sequencing; and molecular evolution, where DNA data are statistically analysed to answer biological questions. Topics currently under investigation include: evolution of altruistic behaviour, evolutionary adaptation, adaptive evolution in humans, and major transitions in evolutionary history.

Adam Eyre-Walker *Molecular evolution.* Rates and effects of new genetic mutations; the evolution of genome structure and recombination in mitochondrial DNA.

Francis Ratnieks *Honey bees, social insects, social evolution and behaviour.* Apiculture; conservation; studying honey bees; stingless bees; Vespinae wasps; ants.

Genetics and Development

We are concerned with understanding the integration of control processes in animal development, and in how information in the genome is converted into a specific set of cellular instructions guiding the formation of a complex organism with its specific organs and systems. This broad goal links a range of specific approaches including biochemistry, molecular genetics, genomics, cell culture, bioinformatics and advanced microscopy.

The group is well equipped for research on mammalian, amphibian and insect species (such as *Drosophila*), and has facilities for vertebrate and invertebrate tissue culture, as well as a wide range of instrumentation for modern imaging and cell and molecular biology. It can provide broadly based research training in both fundamental and applied aspects of eukaryote genetics and modern molecular and developmental biology.

Claudio Alonso *Gene regulation during animal development and evolution.* Investigates *Drosophila* gene regulation and evolution using molecular, genetic, genomic, bioinformatic and microscopy approaches.

Jonathan Bacon Refer to the Neuroscience subject entry on page 132.

Juan Pablo Couso *Molecular and developmental genetics.* Studies limb development, analysing the molecular basis of proximal-distal pattern formation in *Drosophila*.

Paul Graham Refer to the Neuroscience subject entry on page 132.

Mark Maconochie Refer to the Neuroscience subject entry on page 132.

Daniel Osorio Refer to the Neuroscience subject entry on page 132.

Roger Phillips *Molecular interactions by microscopy.* Control of growth and differentiation by intercellular signalling during development by analysing molecular interactions in the fruit fly, *Drosophila*.

Robert Ray *Evolution of gene networks controlling wing patterning in insects.* Studies the developmental networks controlling patterning and morphogenesis in the wings of Diptera (flies) and *Drosophila*.